



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, ILLINOIS 60604

SR-6J

February 19, 2021

Mr. Shannon Johnson  
Georgia-Pacific LLC  
133 Peachtree Street NE  
Atlanta, Georgia 30303

RE: Operable Unit 5, Area 5: Draft Supplemental Remedial Investigation Report Disapproval  
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Dear Mr. Johnson:

The U.S. Environmental Protection Agency (EPA) has completed its review of the Area 5 draft Supplemental Remedial Investigation (SRI) Report, submitted on June 26, 2020, for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. The SRI Report presents the data evaluation and the nature and extent of contamination for Area 5 of the Kalamazoo River from the Trowbridge Dam to the Allegan City Dam.

EPA has enclosed significant comments on the SRI Report, which require revision of the document. Therefore, EPA disapproves the Area 5 SRI Report pending receipt of adequate responses to the enclosed comments and a revised report. Pursuant to the 2007 Administrative Settlement Agreement and Order on Consent a revised SRI Report is due sixty (60) days after receipt of this letter.

Please contact me at (312) 886-0992 if you have any questions regarding this matter.

Sincerely,

A handwritten signature in black ink, appearing to read "J. Saric", is written over a white background.

James A. Saric  
Remedial Project Manager  
SEMD Remedial Response Branch #1

Enclosure

cc: Dan Peabody, EGLE

**U.S. EPA COMMENTS  
ON THE AREA 5  
DRAFT SRI REPORT  
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO  
RIVER SITE**

**GENERAL COMMENTS**

**Commenting Organization: USEPA**

**Commenter: Saric/Mitchell**

**General Comment #: 1**

Given that Allegan City Council has retained a design engineer to evaluate dam removal and adopted a resolution in support of dam removal, it appears probable the dam and its backwater affect will be removed in the near future. Therefore, the anticipated future land use within Area 5 includes the dam being removed. The revised SRI Report should assume the dam is being removed and should describe and document the anticipated post-dam condition of the river system since that will be the future baseline condition. The hydrodynamic model should be revised to reflect the dam-out scenario(s) in the Alternative Screening Technical Memorandum to assist in remedy development.

**Commenting Organization: USEPA**

**Commenter: Saric/Von Wallmenich**

**General Comment #: 2**

In numerous locations throughout the document, including but not limited to the Executive Summary, Section 5.2, and Section 7.3.2, there is reference to (Non-PCB Constituents [D/Fs]) utilizing literature-based statements about relative D/F concentrations for certain generic sources of D/Fs. However, the text fails to recognize that D/Fs have been detected in landfill OUs at the site and are a site-related COC. Therefore, these statements need to be removed or extensively revised to add more site-specific discussion on site data for D/Fs. All such references to D/Fs in this fashion need to be revised throughout the document.

**Commenting Organization: USEPA**

**Commenter: Saric/Dillon/Von Wallmenich**

**General Comment #: 3**

In several sections of the document, including but not limited to the Executive Summary, Section 6.2, and Section 7.4.2, there is a statement that reads, *"Therefore, a formal TBERA quantitatively assessing risk is not warranted for Area 5. Comparison of Area 5 surface soil data to the PRGs is sufficient for risk management decisions for Area 5, as discussed in a Work Group meeting on April 23, 2020. USEPA, EGLE, Georgia-Pacific, and consultants participated in this Work Group meeting"*. This statement is incorrect and should be removed from the document as the use of Area 4 PRGs for this purpose has not been approved by EPA for TEQ.

Section 6.2 of the (Phase I) Area 5 Work Plan dated 11/29/16 and approved by EPA states: *"Consistent with agreements reached with USEPA for Area 1, the Area 5 TBERA will be updated. Conclusions for the in-stream aquatic environment in the CDM BERA (CDM 2003b) will be carried forward for the in-stream portions of Area 5. For the terrestrial floodplain area... The same assessment and measurement endpoints and representative receptors identified for Areas 1 through 4 will be evaluated in Area 5. Because the key elements for the PCB risk evaluation remain unchanged, the scope of the Area 5 TBERA will primarily include the comparison of USEPA-approved PCB PRGs."*

A limited risk evaluation using the total PCB PRG of 11 mg/kg is consistent with the Area 5 Work Plan as the PRG has been approved by EPA in various documents. However, EPA has not formally approved the Total TEQ PRGs of 1,000 ng/kg for mammals and 7,000 ng/kg for birds. The Area 5 ecological risk evaluation for Total TEQs should include the full range of risk-based concentrations (RBCs) for soils. Please add comparisons of soil concentrations to the RBCs listed in Table 6-16 of the Area 4 TBERA.

All references comparing Area 5 soil concentrations to the Total TEQ PRGs from Area 4 for mammals and avian species should be eliminated throughout the document.

**Commenting Organization: EGLE**

**Commenter:**

**General Comment #: 4**

EGLE requests transmittal of the Area 5 hydrodynamic model setup and input files necessary for running the various steady-state flow conditions described in the SRI Report (typical normal flow, Bankfull flow, 2-year return flow, 16-year flow, and 100-year flow), as well as a set of output files for any one of these flow conditions for benchmarking purposes.

**Commenting Organization: EGLE**

**Commenter:**

**General Comment #: 5**

Although the SRI Report refers to a comparison of SEDflume-measured critical shear stress for erosion to hydrodynamic model results of bed shear stress as a line of evidence indicating the stability of the sediment bed in Area 5 (lines 4-5 on page ES-12, lines 1113 on page 5-13, and lines 17-20 on page 7-5), the report does not present such an analysis. The SRI Report should include documentation of the analysis comparing SEDflume-measured critical shear stress for erosion to hydrodynamic model results of bed shear stress. Furthermore, the information included in the SRI Report does not support the notion of sediment stability over the full range of flow conditions. For instance, Figure Q-42d shows bed shear stress in excess of 1 Pa in most of the Area 5 impoundment during the 16-year event. Review of the critical shear stress for erosion measured in Sedflume cores and tabulated in Appendix P shows critical shear stress for erosion for all cores and depth-intervals ranging only up to 1 Pa. This indicates the potential for significant erosion in the Area 5 impoundment during high-flow conditions and is not consistent with the statements about sediment stability. This statement is also true of the more upstream reaches in Area 5.

**Commenting Organization: EGLE**

**Commenter:**

**General Comment #: 6**

There are several references to "MDEQ" throughout the report, especially in Sections 6 and 7. Please revise all references to "EGLE".

**Commenting Organization: EGLE**

**Commenter:**

**General Comment #: 7**

There are several references to "MDCH" throughout the report. Please revise all references to the Michigan Department of Health and Human Services or "MDHHS".

**Commenting Organization: EGLE**

**Commenter:**

**General Comment #: 8**

The Executive Summary states that “Area 5 SRI data, and at times pre-SRI data, were evaluated to accomplish several key objectives.” This statement indicates that not all pre-SRI data were used. Please clarify when pre-SRI data were not used and provide reasoning for each decision. For example, the legend in Figure ES-3a indicates “Data not Used” but does not clarify what dataset these data are from and why they were not used.

**Commenting Organization: EGLE/EPA**

**Commenter:**

**General Comment #: 9**

The Executive Summary states that “soil concentrations in Area 5 are below the PCB and Total TEQ PRGs, indicating unacceptable risk to potential ecological receptors is unlikely.” EGLE and EPA disagree with this statement. Please see General Comment 3 for further explanation.

**Commenting Organization: EGLE**

**Commenter:**

**General Comment #: 10**

During Phase 2 of the SRI an unknown number of cores were processed in a manner that was inconsistent with standard site protocols. Specifically, cores were opened, split in half and, in some instances, one-half of the core material was homogenized and placed into the sample and the other half was disposed of without being processed. In other cases, staff processed the core halves independently of each other and at different sample intervals. For example, after splitting the core tube the left half was processed in 4” intervals, the right half was processed in 6” intervals, and the two halves were processed separately and not combined. The SRI Report should include a discussion on which cores were impacted by this issue and what, if any, impact the processing issues may have had on total PCB (and other) laboratory results.

**Commenting Organization: EGLE/EPA**

**Commenter:**

**General Comment #: 11**

Prior to conducting the Phase 2 SRI, EGLE communicated concern that there may be a low bias in total PCB concentrations reported by Georgia-Pacific’s (GP’s) laboratory. Further information gathered by EPA comparing split sample data in Trowbridge confirmed the low bias, which has ultimately led to the development of a site-specific laboratory methodology for total PCB analysis.

The low bias in total PCB measurements may be under-estimating the nature and extent of contamination and perceived risks in Area 5, resulting in reduced remedial footprints.

The SRI Report should be updated to include a discussion on how the low bias in total PCB concentrations in the Area 5 SRI data may impact remedial footprints and remedy selection within Area 5.

**Commenting Organization: EGLE/EPA**

**Commenter:**

**General Comment #: 12**

In all risk assessments completed for OU-5 to-date, including the Area 5 risk assessment, GP uses site-specific conversion factors to convert total PCBs measured as Aroclors to a dioxin-like PCB concentration for mammals (5.1) and birds (128). EGLE has completed an evaluation of split data, as well as some site-wide data, which suggests that the conversion factor process GP is using may be underestimating the dioxin-like PCBs by a factor of 14.6 for mammals (74.4) and a factor of 5 for birds (667). As a result, the current conversion factor may be underestimating

the concentration and risks associated with dioxin-like compounds (DLCs), the DLC contribution to TEQ and, consequently, total TEQ.

A separate work group meeting is necessary to discuss this potential issue and its impacts on the DLC contribution to TEQ.

## **SPECIFIC COMMENTS**

**Commenting Organization: USEPA**

**Commenter: Mitchell**

**Section: ES**

**Page #: ES-4**

**Specific Comment #: 1**

The report states: *"If the dam is removed, some portion of the currently inundated sediment will become a future floodplain."* The SRI Report should describe what might happen to the rest of the sediments impacted by dam removal (i.e., sediment deposited in the old river channel would become subject to erosion and downstream transport if not managed during dam removal). Consider mentioning the need to manage the erodible sediments.

**Commenting Organization: USEPA**

**Commenter: Mitchell**

**Section: ES**

**Page #: ES-4**

**Specific Comment #: 2**

The heading **Channelized Flow**

This is an unusual or uncommon term for referring to a river channel. The term "channelized flow" is typically used to describe a threshold condition in headwaters where sheet-flow has converged, and channelized flow has formed. Or, in storm-water situations, to describe the same threshold condition. But, in riverine settings we typically say "river channel" or "in-channel."

**Commenting Organization: USEPA**

**Commenter: Mitchell**

**Section: ES**

**Page #: ES-6**

**Specific Comment #: 3**

"Typical normal flow" should be defined.

**Commenting Organization: USEPA**

**Commenter: Mitchell**

**Section: ES**

**Page #: ES-7**

**Specific Comment #: 4**

Figure ES-4b has the same title as Figures ES-4a.

**Commenting Organization: USEPA**

**Commenter: Mitchell**

**Section: ES**

**Page #: ES-7**

**Specific Comment #: 5**

The text describing the hydraulic characteristics should discuss the important role of backwater and related implications. The current text attributes the spatial patterns in velocity and shear stress to the channel slope but that's not correct. Backwater controls the hydraulics and the channel profile is the result of the hydraulic regime created by backwater influence.

**Commenting Organization: USEPA**  
**Section: Tables ES-1 through ES-8**  
**Specific Comment #: 6**

**Commenter: White**

For the tables in the Executive Summary, recommend specifying the depth interval represented by each interval number.

**Commenting Organization: USEPA**  
**Section: 2.2.3.1**  
**Specific Comment #: 7**

**Commenter: White**  
**Page #: 2-18**

Appendix O identifies many of the assumptions underlying the geochronology methods (e.g., sediment deposition occurred at a constant rate over the time period of interest, the sediment bed undergoes limited vertical mixing). Summarize these assumptions in the main text and assess the degree to which they appear to have been met (net deposition rate estimates for locations where the assumptions are not satisfied have a higher degree of uncertainty).

**Commenting Organization: USEPA**  
**Section: 2.2.3.1**  
**Specific Comment #: 8**

**Commenter: White**  
**Page #: 2-18**

Second paragraph: "*The radioisotope <sup>210</sup>Pb is incorporated at a steady rate into sediment via directional deposition, upstream transport, and decay of radon-222 in water.*" Clarify what is meant by "directional deposition." Also, insert "in the atmosphere and" after "radon-222."

**Commenting Organization: USEPA**  
**Section: 3.5.1.1**  
**Specific Comment #: 9**

**Commenter: Mitchell**  
**Page #: 3-5**

In the section describing the floodplains and their connectivity to the river, it should describe how the floodplain and its frequency of inundation will change as a result of the anticipated removal of Allegan City Dam.

**Commenting Organization: USEPA**  
**Section: 3.5.1.2**  
**Specific Comment #: 10**

**Commenter: Mitchell**  
**Page #: 3-5**

The report concludes that "*...observations suggest that Area 5 banks are generally stable...*" (and several similar statements) but this conclusion is incompatible with the general geomorphic behavior of a meandering river which creates its meandering planform through active bank erosion on outer bends and deposition on inner bends. The channel avulsion that occurred at RM 35.8 between 1976 and 1974 that cut off over 2,000 ft of river length is observable evidence of this channel forming processes. The report should include some discussion of the bank erosion and deposition processes that are known to exist in Area 5. Possibly even mapping the banks that are expected to be erosional and those expected to be depositional based on their planform position (inner or outer bank). Two years of bank erosion pin data is not enough data to support broad claims of bank stability.

**Commenting Organization: USEPA**  
**Section: 3.6.2**

**Commenter: Mitchell**  
**Page #: 3-12 & Figure 3-8**

**Specific Comment #: 11**

Figure 3-8 shows that approximately 10 sediment samples from Group 2 (defined as finer-grained bed forms) have more than 50-percent gravel, indicating that the bed form classification is likely incorrect.

**Commenting Organization: USEPA**  
**Section: 3.6.4 Sediment Deposition**  
**Specific Comment #: 12**

**Commenter: Mitchell**  
**Page #: 3-14**

The section documenting sediment deposition fails to describe floodplain deposition.

**Commenting Organization: USEPA**  
**Section: 3.6.4.1**  
**Specific Comment #: 13**

**Commenter: White**  
**Page #: 3-14**

Third and fourth paragraphs: The methodology used to estimate sediment accumulation rates from the PCB profile cores requires more explanation. Section 2.2.3.1 indicates that cores were collected from five locations (AGC-01 through AGC-05) for geochronology analysis, but these paragraphs reference Cs-137 peaks in cores from locations SED-600 through SED-623. The fourth paragraph references a regression relationship related to PCB and Cs-137 peaks. Recommend adding the figure showing the regression relationship to the main document and explaining the relationship more fully.

**Commenting Organization: USEPA**  
**Section: 3.6.4.2**  
**Specific Comment #: 14**

**Commenter: White**  
**Page #: 3-15**

State whether Be-7 was detected in the top interval at any of the other core locations, which would be indicative of recent sediment deposition.

**Commenting Organization: USEPA**  
**Section: 3.6.5**  
**Specific Comment #: 15**

**Commenter: Mitchell**  
**Page #: Figure 3-12**

The color symbology for sediment thickness is difficult to distinguish – the shades of green look too similar.

**Commenting Organization: USEPA**  
**Section: 3.9.1**  
**Specific Comment #: 16**

**Commenter: Mitchell**  
**Page #: 3-22**

RE: input parameters:

The list should include eddy viscosity and state how eddy viscosity was parameterized. Eddy viscosity has a strong influence on the lateral velocity and shear stress distribution.

**Commenting Organization: USEPA**  
**Section: 3.9.2**  
**Specific Comment #: 17**

**Commenter: Mitchell**  
**Page #: 3-23**

The report states: *"Channel slope, as discussed in Section 3.5.1.3, is an important morphological river characteristic when considering the results of the DELFT3D simulation. Figure 3-14 shows a clear change in both channel bottom gradient and water surface profile slope from downstream to upstream of RM 40.4 in*

*Area 5. This abrupt change in slope affects velocities and bed shear stresses in the channel (Figures 3-17a through 3-17d and Figures 3-18a through 3-18d, respectively)."*

It's more accurate to describe backwater as the primary hydraulic control (not channel slope). The channel slope is a result of backwater influence. If backwater is removed (dam removal), the channel slope will respond and revert to a steeper channel.

**Commenting Organization: USEPA**

**Section: 3.9.2**

**Specific Comment #: 18**

The discussion of bed shear stress should be expanded to describe the expected erosion and depositional responses in the river.

**Commenter: Mitchell**

**Page #: 3-23 through 3-24**

**Commenting Organization: USEPA**

**Section: 3.9.3**

**Specific Comment #: 19**

The term calibrated is overly-broad. There are degrees of calibration and this site lacks the data to robustly calibrate the model. It would be useful for readers to understand the limited nature of the calibration and the degree of uncertainty associated with the model predictions.

**Commenter: Mitchell**

**Page #: 3-24**

**Commenting Organization: USEPA**

**Section: 3.9.3**

**Specific Comment #: 20**

The report states: *"The comparison of modeled and observed water levels at 49 points along the length of Area 5 shows a close fit between the modeled surface elevations and (measured) data at this discharge rate, with differences between simulated and observed elevations within 0.1 ft between RM 35.89 and RM 40.61, and mostly within 0.1-0.2 ft between RM 40.70 and RM 44.89."*

**Commenter: Mitchell**

**Page #: 3-24**

Figure Q-25 shows a range slightly greater than +/- 0.3 feet (not 0.1 -0.2 feet). Furthermore, it is more useful to report statistical results such as model error and model bias instead of a loosely defined range. Reporting of model accuracy should include velocity since velocity is a critical component of bed shear stress which drives sediment transport. At this site, the accuracy of velocity predictions is arguably more important than water-level predictions.

**Commenting Organization: USEPA**

**Section: 4.2**

**Specific Comment #: 21**

First sentence: Suggest revising to state "This subsection discusses the nature and extent of contamination based on SRI sediment data."

**Commenter: White**

**Page #: 4-3**

**Commenting Organization: USEPA**

**Section: Figure series 4-3 through 4-13**

**Specific Comment #: 22**

Consider reorganizing this figures series so that all depth intervals from each river segment are grouped together (i.e., the Figure 4-3 series would include all depth intervals for the segment from RM 44.8-43.2), similar to the Figure 4-15 series. It is much easier to visualize the spatial distribution of PCBs with increasing depth in each segment if the maps are grouped together.

**Commenter: White**

**Page #:**

**Commenting Organization: USEPA**  
**Section: 4.2.1**

**Commenter: White**  
**Page #: 4-4**

**Specific Comment #: 23**

Third paragraph, first sentence: clarify the meaning of the phrase "*The interpolated areas of higher PCB concentrations are limited by interpolated areas of lower PCB concentrations . . .*"

**Commenting Organization: USEPA**  
**Section: 4.2.1**

**Commenter: White**  
**Page #: 4-4**

**Specific Comment #: 24**

Last paragraph: "*. . . such that SWACs are most heavily influenced by relatively high concentrations at a few locations.*" The meaning of this phrase is unclear since an area-weighted averaging approach explicitly accounts for the spatial extent of the higher (and lower) concentration areas. Recommend deleting this sentence. The same comment applies to Section 4.2.2, page 4-9, third paragraph.

**Commenting Organization: USEPA**  
**Section: 4.2.1**

**Commenter: White**  
**Page #: 4-5**

**Specific Comment #: 25**

First paragraph: "*Bootstrapping is the recommended SWAC calculation method for stratified data in Draft USEPA SWAC Guidance References (USEPA 2015a).*" Please provide the correct reference for USEPA 2015a in the reference list (USEPA 2015a is listed in the references as the ProUCL Version 5.1 Technical Guide, which does not address SWACs).

**Commenting Organization: USEPA**  
**Section: 4.2.1**

**Commenter: White**  
**Page #: 4-5**

**Specific Comment #: 26**

Last paragraph: "*Four geochronology cores . . . were not reoccupied but their thin-interval PCB profiles are shown on the figures for completeness.*" Recommend deleting this statement and noting instead that the profiles from the individual geochronology cores show evidence of burial by relatively cleaner sediment over time, even though these locations were not previously sampled. This comment also applies to Section 4.2.2, page 4-9, 4<sup>th</sup> paragraph. It would be informative to add a figure showing the PCB profiles in the fine-interval cores with depth on the y-axis and PCB concentration on the x-axis, rather than using color-coded bins. The vertical concentration trends may provide another line of evidence about recovery rates.

**Commenting Organization: USEPA**  
**Section: 4.2.2**

**Commenter: White**  
**Page #: 4-6**

**Specific Comment #: 27**

First paragraph: "*Median values in Intervals 6 and 7 appear relatively higher . . .*" Replace "appear to be" with "are" – the median is a statistical estimate based on an unbiased data set.

**Commenting Organization: USEPA**  
**Section: 4.2.2**

**Commenter: White**  
**Page #: 4-7**

**Specific Comment #: 28**

Last paragraph, third bullet: Recommend replacing "elevated" with a concentration value (assumed to be 5 mg/kg given the previous bullet) given that any concentration above background could be considered "elevated."

**Commenting Organization: USEPA**  
**Section: 4.2.2**

**Commenter: White**  
**Page #: 4-9**

**Specific Comment #: 29**

First paragraph: "*Samples within each bedform group . . . were given the same area weight by river section.*" The meaning of this statement is not clear. Recommend providing additional explanation of the SWAC calculation approach in the main body of the document.

**Commenting Organization: USEPA**  
**Section: 4.2.3**

**Commenter: White**  
**Page #: 4-10**

**Specific Comment #: 30**

The text in this section is confusing. To improve clarity, add a table summarizing the locations and PCB concentrations for the data shown in Figure 4-24 in a format that shows which locations were reoccupied in each time period. It appears that the sample locations for the 1993/1994, 2000, and 2019 data sets are not exactly the same. Is the trend line similar if only locations sampled in all three time periods are used, even if the smaller data set does not meet the power criterion?

**Commenting Organization: USEPA**  
**Section: 4.4.2**

**Commenter: Mitchell**  
**Page #: 4-20**

**Specific Comment #: 31**

The definition of statistical significance should be defined (i.e. a p-value threshold, or other metric).

**Commenting Organization: USEPA**  
**Section: 4.5.2.2**

**Commenter: White**  
**Page #: 4-25**

**Specific Comment #: 32**

Recommend including figures showing the trend plots and regression relationships for fish tissue, which would visually convey the variability in the data.

**Commenting Organization: USEPA**  
**Section: 4.5.2.2**

**Commenter: White**  
**Page #: 4-25**

**Specific Comment #: 33**

First paragraph: "*Generally, higher trophic-level fish such as adult SMB lag in time to recover from historical exposure compared to smaller and/or younger fish.*" The text should indicate that feeding behavior may also influence fish tissue recovery trends.

**Commenting Organization: USEPA**  
**Section: 5.1.2**

**Commenter: Mitchell**  
**Page #: 5-2**

**Specific Comment #: 34**

The discussion of PCB fate should include a description of what happens to PCBs that are transported all the way through Area 5 and continue downstream.

**Commenting Organization: USEPA**  
**Section: 5.2**

**Commenter: Von Wallmenich**  
**Page #: 5-2**

**Specific Comment #: 35**

Section 5.2 (Non-PCB Constituents [D/Fs]) makes literature-based statements about relative D/F concentrations for certain generic sources of D/Fs. However, the text fails to recognize that D/Fs have been detected in landfill OUs at the site and are a site-related COC. Therefore, the

statements in this section, and the similar D/F language in the Executive Summary, need to be removed or extensively revised to add more site-specific discussion on site data for D/Fs.

**Commenting Organization: USEPA**

**Commenter: White**

**Section: 5.3**

**Page #: 5-3**

**Specific Comment #: 36**

Second paragraph: *"Suspended fine sediments containing PCBs were carried by the river flow to Area 5 during historical periods of paper product recycling (generally, the mid-1950s through the 1970s)."* As written, this sentence implies that PCB transport into Area 5 stopped after the 1970s. Revise to clarify that PCB transport began during historical periods of paper product recycling.

**Commenting Organization: USEPA**

**Commenter: White**

**Section: 5.3**

**Page #: 5-4**

**Specific Comment #: 37**

First minor bullet under the second major bullet: *"Surface sediments with lower PCB concentrations, subject to more recent sediment deposition from bedload from upstream areas."* Insert "suspended and" before bedload.

**Commenting Organization: USEPA**

**Commenter: White**

**Section: 5.3**

**Page #: 5-4**

**Specific Comment #: 38**

Third major bullet: *"Sediment erosion does not result in relatively high surficial PCB concentrations because surface SWACs throughout Area 5 are overall low."* The SWAC in Section 3, which is in the transition zone, is higher than the SWACs in Sections 1 and 2 and the impounded lake. Either delete this sentence or revise to clarify what is meant by "relatively high" and "overall low." This comment also applies to the same sentence in the last paragraph on page 5-12 and fourth paragraph on page 5-14.

**Commenting Organization: USEPA**

**Commenter: Mitchell**

**Section: 5.3.4.3**

**Page #:**

**Specific Comment #: 39**

This section should describe the planned removal of Allegan City Dam and the associated changes to the hydraulic regime.

**Commenting Organization: USEPA**

**Commenter: White/Dillon**

**Section: 5.3.4.3.3**

**Page #: 5-13**

**Specific Comment #: 40**

Last paragraph: This paragraph provides several hypotheses for why recovery trends are observed in some media and not others. Another likely factor that would explain the differences in the trends seen in carp and adult smallmouth bass is trophic structure. Carp are exclusively exposed to the pool of PCBs in the sediment so declines in sediment PCB concentrations would more directly lead to reductions carp tissue PCB concentrations. Smallmouth bass are indirectly exposed to PCBs in sediment. Their exposure is through the pool of PCBs that is circulating through the food web. The more complex trophic relationships associated with adult smallmouth bass feeding makes the relationship between declines in sediment PCB concentrations and reduction in smallmouth bass tissue concentrations more uncertain.

**Commenting Organization: USEPA**  
**Section: Figures 5-1 through 5-3**  
**Specific Comment #: 41**

**Commenter: White**  
**Page #:**

The y-axis on these graphs (samples per river mile) is confusing – for example, Figure 5-1a appears to show that 1600 samples were collected in the vicinity of river mile 36.5. Clarify the definition of the y-axis in the footnotes.

**Commenting Organization: USEPA**  
**Section: 6.1.9**  
**Specific Comment #: 42**

**Commenter: Saric**  
**Page #: 6-10**

All references and comparisons for recreational receptors to Total TEQ should be made relative to the Michigan Part 201 non-residential cleanup level of 990 ng/kg, as it is an ARAR. This comparison also occurs in the Executive Summary.

**Commenting Organization: USEPA**  
**Section: 6.2**  
**Specific Comment #: 43**

**Commenter: Dillon**  
**Page #:**

The risk evaluation for Area 5, presented in Section 6.2, uses site-wide PRGs for surface soils based on the prior Area-specific risk evaluations. A PRG of 11 mg/kg for floodplain soil was used for total PCBs based on the USEPA-approved Area 1 TBERA (Appendix B of ARCADIS 2012). PRGs of 1,000 ng/kg and 7,000 ng/kg associated with mammalian Total TEQ and avian Total TEQ, respectively, in floodplain soil were used as presented in the Area 4 Alternatives Screening Technical Memorandum (Wood 2019c). Section 6.2 of the (Phase I) Area 5 Work Plan dated 11/29/16 and approved by EPA states: *“Consistent with agreements reached with USEPA for Area 1, the Area 5 TBERA will be updated. Conclusions for the in-stream aquatic environment in the CDM BERA (CDM 2003b) will be carried forward for the in-stream portions of Area 5. For the terrestrial floodplain area... The same assessment and measurement endpoints and representative receptors identified for Areas 1 through 4 will be evaluated in Area 5. Because the key elements for the PCB risk evaluation remain unchanged, the scope of the Area 5 TBERA will primarily include the comparison of USEPA-approved PCB PRGs.”*

A limited risk evaluation using the total PCB PRG of 11 mg/kg is consistent with the Area 5 Work Plan as the PRG has been approved by EPA in various documents. However, EPA has not formally approved the Total TEQ PRGs of 1,000 ng/kg for mammals and 7,000 ng/kg for birds. The Area 5 ecological risk evaluation for Total TEQs should include the full range of risk-based concentrations (RBCs) for soils. Please add comparisons of soil concentrations to the RBCs listed in Table 6-16 of the Area 4 TBERA.

**Commenting Organization: USEPA**  
**Section: 6.2**  
**Specific Comment #: 44**

**Commenter: von Wallmenich**  
**Page #: 6-15**

The statement *“Therefore, a formal TBERA quantitatively assessing risk is not warranted for Area 5. Comparison of Area 5 surface soil data to the PRGs is sufficient for risk management decisions for Area 5, as discussed in a Work Group meeting on April 23, 2020. USEPA, EGLE, Georgia-Pacific, and consultants participated in this Work Group meeting”* should be removed from the document as the use of Area 4 PRGs for this purpose has not been approved by EPA for D/Fs as expressed as TEQ.

**Commenting Organization: USEPA**

**Commenter: Saric**

**Section: 7.4.2**

**Page #: 7-16**

**Specific Comment #: 45**

After completing the Area 5 ecological risk evaluation for Total TEQs utilizing the full range of risk-based concentrations (RBCs) for soils as listed in Table 6-16 of the Area 4 TBERA, the conclusions based upon ecological risk for TEQ may need to be changed.

**Commenting Organization: USEPA**

**Commenter: White**

**Section: Appendix O**

**Page #:**

**Specific Comment #: 46**

Core profile figures: consider replacing the panel showing the Be-7 results with percent fines, which is an indicator of whether sediment depositional processes were constant over time.

**Commenting Organization: USEPA**

**Commenter: Mitchell**

**Section: Appendix Q**

**Page #: Q-40**

**Specific Comment #: 47**

What is the basis for adjusting roughness to modify predicted flow depths when there is known uncertainty in both the flow rate and channel roughness?

**Commenting Organization: USEPA**

**Commenter: Mitchell**

**Section: Appendix Q**

**Page #: Q-43**

**Specific Comment #: 48**

On Figure Q-25, the water-level residual plot suggests that the model is missing a hydraulic control near river mile 42.

**Commenting Organization: USEPA**

**Commenter: Mitchell**

**Section: Appendix Q**

**Page #: Q-51**

**Specific Comment #: 49**

Please clarify the type of shear stress being reported (i.e., total bed shear, grain shear stress, etc.).

**Commenting Organization: EGLE**

**Commenter:**

**Section: 1.2**

**Page #: 1-2**

**Specific Comment #: 50**

Revise the Channelized Flow bullet point to include a brief description of the three river sections shown on Fig 1-2.

**Commenting Organization: EGLE**

**Commenter:**

**Section: 1.2**

**Page #: 1-2**

**Specific Comment #: 51**

Section 1.2 states that "*Aerial photographs from 1938 onward show that the channel is generally stable and has not migrated significantly in the last 82 years (Figures 13a through 1-3l).*" However, the aerial photographs stop at 1993 (Figure 1-3l). Please include aerial photographs from 1993 to the present.

**Commenting Organization: EGLE**

**Section: 2.2.2.5**

**Specific Comment #: 52**

Section 2.2.2.5 states that of the 13 parcels selected for ISM sampling, 7 of the parcels were sampled, while 6 were not accessible (i.e. submerged or property access not obtained). Have additional attempts been made to access and sample these 6 parcels?

**Commenter:**

**Page #: 2-17**

**Commenting Organization: EGLE**

**Section: 3.4.4**

**Specific Comment #: 53**

The section lists bird types listed in Table 3-5 but does not mention piscivores. Revise the text to include piscivores.

**Commenter:**

**Page #: 3-3**

**Commenting Organization: EGLE**

**Section: 3.4.5**

**Specific Comment #: 54**

The last sentence states that "*Additional details regarding the federal and State protected species in Area 5 are presented in Appendix K*". Delete that sentence, because Section 5.3 of Appendix K repeats nearly verbatim the information in the SRI Section 3.4.5. There is no additional information about threatened and endangered species in Appendix K.

**Commenter:**

**Page #: 3-4**

**Commenting Organization: EGLE**

**Section: 3.5.1.4**

**Specific Comment #: 55**

Include reference to an existing figure or include a new figure to support the discussion of scour hole locations.

**Commenter:**

**Page #: 3-8**

**Commenting Organization: EGLE**

**Section: 3.6.4**

**Specific Comment #: 56**

The statements about limited deposition of fines in the upstream reaches and fines deposition in inner bends and channel edges should be supported by the measured grain size distribution presented in Figures 3-10a through 3-10e. Revise the text to include such supporting evidence.

**Commenter:**

**Page #: 3-14**

**Commenting Organization: EGLE**

**Section: 3.6.4.3**

**Specific Comment #: 57**

The relative comparison of erodibility index to the critical shear stress for erosion is reasonable – cores with greater critical shear stress for erosion tend to have lower erosion rates (i.e., erodibility index <1). Revise the text to also include a discussion of the results – is there a spatial pattern to the distribution of the less and more erodible cores, does the erodibility correlate qualitatively with any other physical property such as ambient shear stress regime, grain size distribution, etc. Such a comparison will be useful in the eventual use of this data during remedy development.

**Commenter:**

**Page #: 3-16**

**Commenting Organization: EGLE**  
**Section: 3.9**

**Commenter:**  
**Page #: 3-21**

**Specific Comment #: 58**

The discussion in Section 3.9 proceeds directly from model setup (Section 3.9.1) to model application (Section 3.9.2). For completeness, also include a discussion of model calibration including calibration metrics, calibration periods, and calibration parameters.

**Commenting Organization: EGLE**  
**Section: 4.1.2.2**

**Commenter:**  
**Page #: 4-2**

**Specific Comment #: 59**

Section 4.1.2.2 states that biased data were used in impounded lake PCB SWAC calculations, but biased data were not used in channelized flow sediment and floodplain soil SWAC calculations. Please explain why biased data were used in some SWAC calculations, but not others.

**Commenting Organization: EGLE**  
**Section: 4.4.1**

**Commenter:**  
**Page #: 4-18**

**Specific Comment #: 60**

Just as Julian day and temperature are correlated, so are flow rate and temperature due to seasonality in river flow. Revise the text to comment on the potential for multicollinearity and confounded interpretation of the multivariate regression results because of the relationship between river flow rate and temperature.

**Commenting Organization: EGLE**  
**Section: 4.4.2**

**Commenter:**  
**Page #: 4-20**

**Specific Comment #: 61**

It is not clear why a linear trend should be expected between total suspended solids (TSS) and Julian Day; revise the text to clarify. The apparent trend of higher concentrations towards the middle of the year may correlate with seasonality in primary production – standard analytical methods for TSS also capture algal dry matter. Therefore, the presence of algal dry matter may be a plausible explanation for the apparent seasonality (higher values mid-year) in TSS.

**Commenting Organization: EGLE**  
**Section: 5.1.2**

**Commenter:**  
**Page #: 5-2**

**Specific Comment #: 62**

Delete the reference to bedload as a source of fine sediment. Bedload is comprised of sands or non-cohesive material, and by definition, does not include fine sediment which is typically used to refer to silts and clays.

**Commenting Organization: EGLE**  
**Section: 5.3**

**Commenter:**  
**Page #: 5-4**

**Specific Comment #: 63**

The basis for statements in some of the sub-bullets is not clear. These include the first, second, fourth, and fifth sub-bullets discussing recent deposition of bedload, erosional areas, contaminant inventory in backwater/island areas, and potential erosion of older sediments. Provide additional detail to support the bases for the sub-bulleted statements.

**Commenting Organization: EGLE**  
**Section: 5.3.2**

**Commenter:**  
**Page #: 5-4**

**Specific Comment #: 64**

The analysis using Figures 5-1 through 5-4 needs further discussion. Specifically, the data analysis used to generate these figures should be described in further detail, terms such as “inundation width” and “fractions of grain size samples” should be defined, units should be consistently defined (for instance, “inundation width” is discussed in terms of length units in the text but in terms of “Samples per River Mile” on the figures), and the analysis methodology (e.g., “searches of the sample dataset were performed within a search window to summarize the sample density (samples per mile) of sediments satisfying a given criterion”) should be described in more detail. As it stands, the analysis and resultant discussion in this section is unclear.

**Commenting Organization: EGLE**  
**Section: 5.3.4.3.1**

**Commenter:**  
**Page #: 5-11**

**Specific Comment #: 65**

The text alludes to Figures 5-5c and 5-5d showing complex hydrodynamics and differential erosion and deposition. However, neither of these are apparent in these figures which only contains water surface elevation, bathymetry, and PCB concentrations with depth. Review and revise the text and/or figures, as appropriate.

**Commenting Organization: EGLE**  
**Section: 6.1**

**Commenter:**  
**Page #: 6-1**

**Specific Comment #: 66**

The first paragraph states that risk calculations for anglers are based on just two Aquatic Biota Sampling Areas (ABSAs), ABSA-09AC.1 (flowing RM 43.6 to 42.6) and ABSA-09AC.2 (lake RM 36.9 to 35.9), and that the data from both ABSAs were combined. The data from the two ABSAs should be analyzed both separately and combined. The purpose of collecting fish tissue in the flowing section and the impounded section should be to identify potential differences in uptake from the scoured bottom and the depositional area. The Baseline Human Health Risk Assessment (BHHRA) should be revised to show risks from both areas.

**Commenting Organization: EGLE**  
**Section: 6.1**

**Commenter:**  
**Page #: 6-1**

**Specific Comment #: 67**

Tables indicate that fish consumption cancer risk for both subsistence and sport fisher appear significantly lower than was reported in the 2003 BHHRA (still greater than EGLE acceptable, but lower than 2003). Have the fish tissue concentrations dropped significantly? Section 7 lists some statements about tissue concentration differences over the years, but it adds no support for those statements.

**Commenting Organization: EGLE**  
**Section: 7.2.4.2**

**Commenter:**  
**Page #: 7-11**

**Specific Comment #: 68**

The short paragraphs stating whether fish tissue PCB concentrations have decreased do not offer any back-up. For example, “The SMB fillet data from the impounded lake have not decreased from 1999 to 2016 based on regression modeling.” Revise the statements in this

section to include proof, such as tables, graphs, and/or appendices to demonstrate that the statements are consistent with the data.

**Commenting Organization: EGLE**  
**Section: Appendix Q, 2.0**  
**Specific Comment #: 69**

**Commenter:**  
**Page #: Q-2**

The purpose of the spillway capacity discharge rating curve in Figure Q-1 is not clear, nor is the basis for the development of this rating curve. Revise the text as appropriate.

**Commenting Organization: EGLE**  
**Section: Appendix Q, 3.1.1**  
**Specific Comment #: 70**

**Commenter:**  
**Page #: Q-7**

In the lower panel of Figure Q-4, unlike the other periods, it is not clear why the 2001-2005 data was not segregated into separate trend-lines upstream and downstream of Morrow Lake. Revise the analysis/discussion as appropriate.

**Commenting Organization: EGLE**  
**Section: Appendix Q, 4.1**  
**Specific Comment #: 71**

**Commenter:**  
**Page #: Q-12 to Q14**

Although this section is titled "Flow Estimation and Discharge Rating - Impounded Lake", it does not present any flow estimates. Review and revise as appropriate.

**Commenting Organization: EGLE**  
**Section: Appendix Q, 4.2**  
**Specific Comment #: 72**

**Commenter:**  
**Page #: Q-15**

The development of the stage-discharge rating curve should be described in more detail and supported by graphics of the data used to develop this rating curve.

**Commenting Organization: EGLE**  
**Section: Appendix Q, 4.2**  
**Specific Comment #: 73**

**Commenter:**  
**Page #: Q-16 and Q-18**

Examination of Figures Q-12 and Q-14 show a periodicity (period ~2 days) during relatively low flow periods (e.g., in early September 2019) at both locations and apparent in stage as well as flow estimated using rating curves. Revise the text to discuss these trends and the likely reason behind this trend.

**Commenting Organization: EGLE**  
**Section: Appendix Q, 4.2**  
**Specific Comment #: 74**

**Commenter:**  
**Page #: Q-17**

The data represented by the grey triangles in Figure Q-13 are not discussed in the text and nor is it clear if/how that relationship was used in subsequent analyses. Review and revise the text as appropriate.

**Commenting Organization: EGLE**  
**Section: Appendix Q, 5.1**  
**Specific Comment #: 75**

**Commenter:**  
**Page #: Q-18 and Q-19**

The presentation of the two methods to estimate mean daily flow in Area 5 should be expanded to include presentation of the performance of the two methods to the USGS data at the Near Allegan Station from 2001-2005 for an assessment of the goodness-of-fit. This will provide confidence in the statistics of daily mean flow from the two methods in Tables Q-4 and Q-5 and potentially also help in selecting one method over the other.

**Commenting Organization: EGLE**  
**Section: Appendix Q, 5.2**  
**Specific Comment #: 76**

**Commenter:**  
**Page #: Q-23**

Provide context for the analysis in section 5.2. It is unclear why it is necessary to develop estimates of the peak flow rates.

**Commenting Organization: EGLE**  
**Section: Appendix Q, 5.2.1**  
**Specific Comment #: 77**

**Commenter:**  
**Page #: Q-23 and Q-24**

It is not clear why data from Comstock, Fennville, and New Richmond are presented in the context of estimating peak flows from mean daily flows in Area 5. Similarly, it is not clear why the Fennville Station relationship was selected for use to convert the Area 5 mean daily flows to peak discharges when Figure Q-17 includes a relationship between Area 5 mean daily flows and peak discharges. Revise the text to discuss this.

**Commenting Organization: EGLE**  
**Section: Appendix Q, Section 5.2.3**  
**Specific Comment #: 78**

**Commenter:**  
**Page #: Q-29**

The information in Table Q-9 needs further discussion in the text. For instance, why are estimates at Fennville presented for various values of G, any conclusions from the comparison of the three flow estimates for various return periods at Area 5, how does the flow estimates for Area 5 in Table Q-9 relate to the ones in Table Q-8, etc.

**Commenting Organization: EGLE**  
**Section: Appendix Q, Section 8.3**  
**Specific Comment #: 79**

**Commenter:**  
**Page #: Q-43**

The bias in water level between model and data can also be examined relative to the accuracy of the LiDAR water level measurements. Review and revise the text as appropriate.

**Commenting Organization: EGLE**  
**Section: Appendix Q, Section 8.3**  
**Specific Comment #: 80**

**Commenter:**  
**Page #: Q-44**

Provide the dates and source of the data described in the third and fourth bullets on the page.

**Commenting Organization: EGLE**  
**Section: Appendix Q, Sections 8.4 and 8.5**  
**Specific Comment #: 81**

**Commenter:**  
**Page #: Q-44 and Q-45**

Section 8.4 and 8.5 relate to model inputs but are presented after the discussion of model calibration performance in Section 8.3. Consider moving these sections prior to Section 8.3.